

## CALIXPYRROLES, CALIXPYRIDINOPYRROLES AND CALIXPYRIDINES

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## **Abstract of the Disclosure**

The present invention provides calixpyrrole, calixpyridinopyrrole, and calixpyridine macrocycles, having 4, 5, 6, 7, or 8 heterocyclic rings, as well as syntheses, derivatives, conjugates, multimers, and solid supports thereof. Such macrocycles have proved to be effective and selective ion- and neutral molecule-binding agents forming supramolecular ensembles, and ion- and neutral molecule-separation agents. The macrocycles are fully *meso*-non-hydrogen-substituted porphyrinogens, a few molecules of which were previously known but not recognized as possessing anion- or molecule-binding properties. The binding mode is noncovalent, primarily that of hydrogen-bonding, thereby providing a new mode for liquid chromatography, that of Hydrogen Bonding Liquid Chromatography. Further useful applications of the macrocycles provided herein include environmental remediation by removal of undesired ions or neutral molecules, and removal of phosphate for kidney dialysis.

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